

Natriuretic peptides and echocardiography in acute dyspnoea: implication of elevated levels with normal systolic function

Keyur B. Shah¹, Willem J. Kop¹, Robert H. Christenson², Deborah B. Diercks³, Dick Kuo⁴, Sue Henderson¹, Karen Hanson⁴, Shu-Ying Li¹, and Christopher R. deFilippi^{1*}

¹Division of Cardiology, Department of Medicine, The University of Maryland School of Medicine, G3K63, 22 S. Greene St, Baltimore, MD21201, USA; ²Department of Pathology, The University of Maryland School of Medicine, Baltimore, MD, USA; ³Department of Emergency Medicine, University of California Davis, Sacramento, CA, USA; and ⁴Department of Emergency Medicine, The University of Maryland School of Medicine, Baltimore, MD, USA

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Aims

Previous evaluations of natriuretic peptide (NP) levels in patients with acute dyspnoea presenting to the emergency department (ED) have selected only a minority of patients for echocardiography. We aimed to evaluate the association between NPs and more subtle echocardiographic findings and to assess the potential for NPs to provide additional prognostic information beyond that provided by echocardiography in 'all-comers' with acute dyspnoea.

Methods and results

Prospective echocardiograms were performed on 338/412 patients presenting to the ED with acute dyspnoea. B-type natriuretic peptide and NT-proBNP were measured on presentation. Patients were followed-up for 1 year. Decompensated heart failure was diagnosed in 37% of patients and 13% died. The diagnostic accuracy (c-statistic) of BNP and NT-proBNP for identifying LVEF $\leq 40\%$ was 0.88 ($P < 0.001$) and 0.86 ($P < 0.001$), respectively. The c-statistics for BNP and NT-proBNP for identifying diastolic dysfunction were 0.67 ($P < 0.001$) and 0.67 ($P < 0.001$); but only 0.57 ($P = 0.09$) and 0.60 ($P = 0.02$) in patients with LVEF $\geq 50\%$. Natriuretic peptides, but not LV mass or diastolic parameters, independently predicted mortality at 1 year in all patients and in those with an LVEF $\geq 50\%$.

Conclusion

In an acute dyspnoea population with 'all-comers' undergoing echocardiography, NPs correlate strongly with structural abnormalities and identify those with preserved LVEF at highest risk for death. Careful interpretation of elevated NP values is needed in the presence of preserved systolic function.

Keywords

Heart failure • Natriuretic peptides • Echocardiography • Prognosis

Introduction

B-type natriuretic peptide (BNP) is a cardiac neurohormone secreted from the myocardium in response to increased intracardiac volume and pressure. The 108 amino-acid prohormone of BNP is synthesized within the myocytes and is cleaved into an active 32-amino acid fragment (BNP) and an inactive 77-amino acid fragment, N-terminal pro B-type natriuretic peptide (NT-proBNP). Elevated natriuretic peptide (NP) levels help identify patients with cardiac causes of dyspnoea.^{1,2}

Previous investigators have attempted to establish a role for NPs as a proxy for echocardiography. B-type natriuretic peptide and

NT-proBNP have high negative predictive values when screening asymptomatic patients for LV dysfunction.^{3,4} They are also associated with echocardiographic findings suggestive of diastolic dysfunction in patients with and without systolic dysfunction referred for echocardiography.^{5–7}

However, efforts to evaluate the relationship between NPs and echocardiographic indices of structural and functional heart disease are imperfect. Published data for echocardiography and NPs are limited by selection bias. For example, in the ProBNP Investigation of Dyspnea in the Emergency Department Study (PRIDE), which established the diagnostic utility of NT-proBNP for heart failure, only 22% of the study population underwent echocardiography.^{1,8}

* Corresponding author. Tel: +1 410 328 7204, Fax: +1 410 328 1498, Email: cdefilip@medicine.umaryland.edu

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